

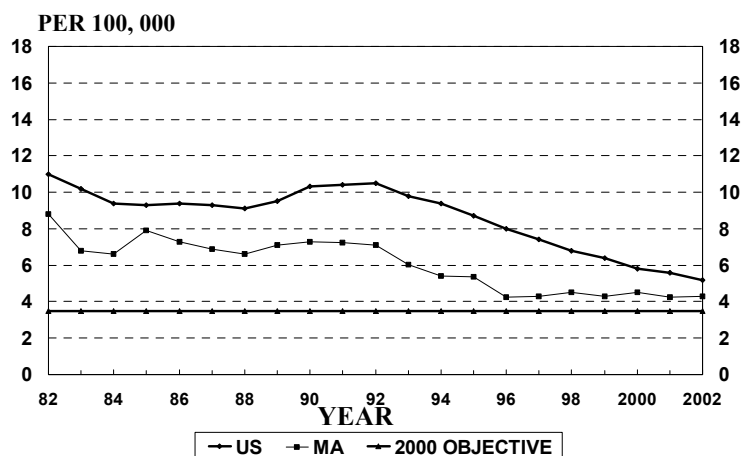
**Massachusetts Department of Public Health
Bureau of Communicable Disease Control
Division of Tuberculosis Prevention and Control**

2002 Tuberculosis Overview

EPIDEMIOLOGY

In 2002, 271 cases (case rate 4.27 per 100,000 population) of tuberculosis (TB) were reported to and verified by the Massachusetts Department of Public Health, Division of TB Prevention and Control. Although this represents a 40% overall decline in the case rate since 1992, case rates have remained stable since 1996.

**UNITED STATES AND MASSACHUSETTS
TUBERCULOSIS CASE RATES
1982 - 2002**



MDPH/DIVISION OF TB

Note: Case rates are based on estimated population projected for each year. 1990 and 2000 case rates were calculated using 1990 and 2000 U.S census figures. All case rates are per 100,000 population.

Seventy-six percent of Massachusetts TB morbidity is reported from the 23 largest communities. In addition, two communities of less than 50,000 populations are also considered to be at higher risk of TB (Appendix 1). Although Boston continues to be the community with the highest incidence of TB (67 cases in 2002, case rate 11.37), the number of TB cases reported from Boston has decline 28% since 1998. Comparison of TB cases reported between 1998 -1999 to those reported between 2001 - 2002 indicates that 5 communities

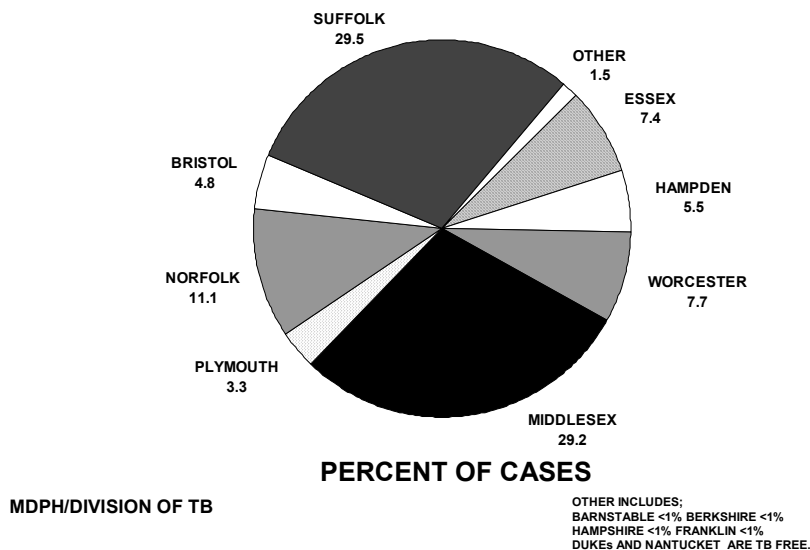
have experienced an overall increase of TB cases; Framingham, Haverhill, New Bedford, Revere and Waltham.

Of the 351 cities and towns in Massachusetts, 69 (20%) had TB cases. Of these 69 communities, 18 (26%) had 5 cases or more of TB and each of the remaining 51 (74%) communities had less than 5 cases (see Appendix 2).

Analyses of the distribution of TB cases by Community Health Network Area (CHNA) indicate that 7 CHNAs had 5 or more cases of TB and CHNA 19 (City of Boston/Chelsea/Revere/Winthrop) had the largest proportion of TB cases (31%) (see Appendix 3).

Analyses of TB cases by county of residence indicate that almost 59% of the cases were reported from two counties, Suffolk (30%) (mostly the City of Boston), and Middlesex (29%), the largest county. Four of the 14 counties (Barnstable, Berkshire, Hampshire, and Franklin) had $\leq 1\%$ of TB cases. Dukes and Nantucket Counties did not report any TB cases in 2002.

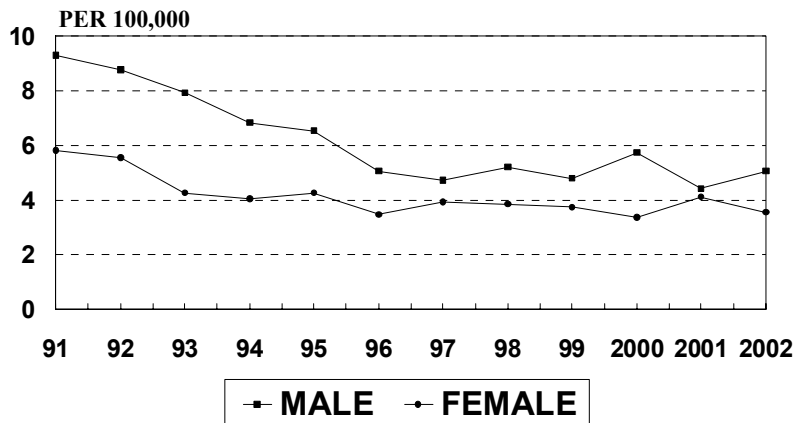
MASSACHUSETTS VERIFIED TUBERCULOSIS CASES BY COUNTY 2002 (N = 271)



2. Sex, Race and Age

Of the 271 TB cases, 155 (57%) were male and 116 (43%) were female. The case rates for both males and females declined between 1991 and 1996. Since 1996, the case rates for both remained relatively stable.

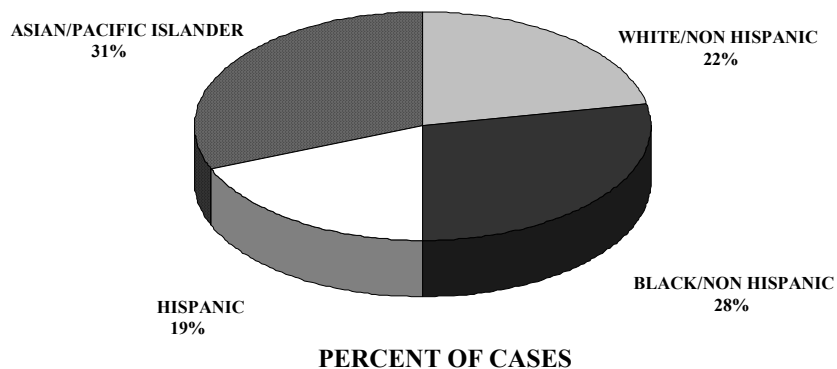
MASSACHUSETTS TB CASE RATES BY GENDER 1991 - 2002



MDPH/DIVISION OF TB

The majority of the TB cases in 2002 (213 cases, 78%) occurred among minority groups: Black (77 cases, 28%), Asian (84 cases, 31%), and Hispanic (52 cases, 19%).

MASSACHUSETTS TUBERCULOSIS CASES BY RACE/ETHNICITY 2002 (N=271)

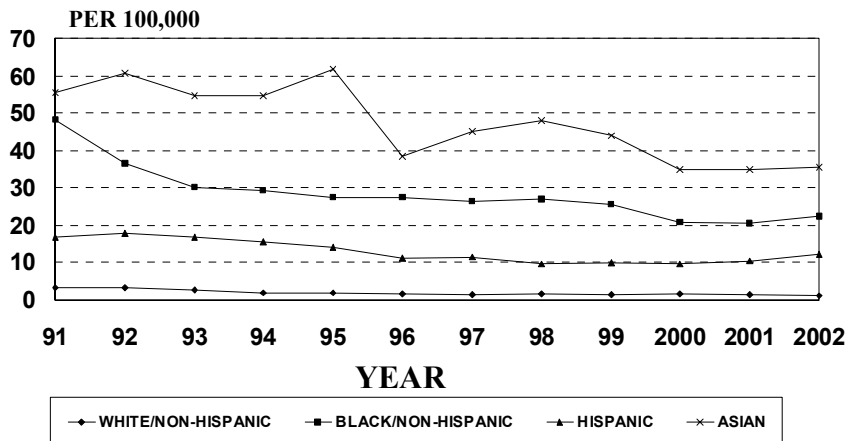


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Analyses of case rates for Whites and Hispanics indicate a gradual decline in TB case rates for both groups between 1992-1996 that has since stabilized. For

Blacks, the case rate has declined from 48.13 in 1991 to 22.42 in 2002. Although Asians continue to have a much higher case rate than any other racial group (35.28 in the year 2002), the rate has been stable since the year 2000.

MASSACHUSETTS TUBERCULOSIS CASE RATES BY RACE/ETHNICITY 1991 - 2002



MDPH/DIVISION OF TB

Relative risks (RR) for TB disease in minority groups are much higher in respect to Whites (RR_{Black}=20.76, RR_{Hispanic}=11.23, RR_{Asian}=32.67).

TUBERCULOSIS CASE RATES BY RACE/ETHNICITY MASSACHUSETTS, 2002

RACE/ETHNICITY	# CASES	CASE RATE	RELATIVE RISK
WHITE/NH	58	1.08	1
BLACK/NH	77	22.42	20.76
HISPANIC	52	12.13	11.23
ASIAN, P.I.	84	35.28	32.67

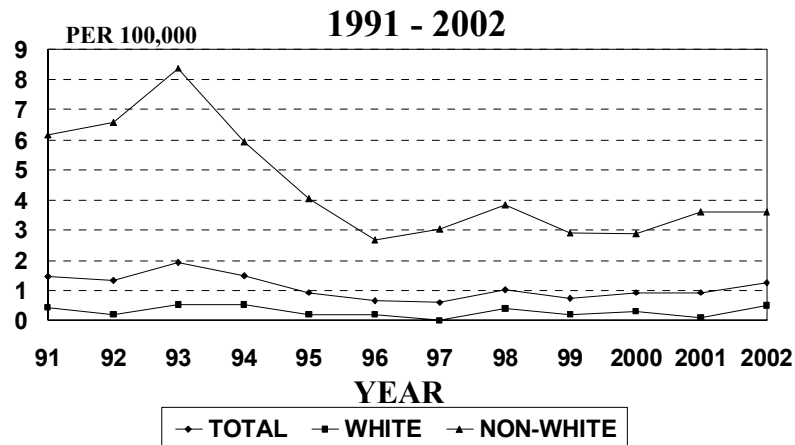
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NH = NON HISPANIC

In
2002,
15

cases (6%) of TB occurred in children < 15 years of age. Ten (67%) were minority group children. Analyses of case rates indicate that TB among minority group children has remained relatively stable since 1996.

MASSACHUSETTS TUBERCULOSIS IN CHILDREN <AGE 15 YEARS CASE RATES BY RACE/ETHNICITY



MDPH/DIVISION OF TB

Analyses of TB cases reported in 2002, by age, indicate that 43 cases (16%) were less than 25 years old, 117 cases (43%) were between the ages of 25 – 44 years, 69 cases (25%) were between the ages of 45 – 64 years and 42 cases (16%) were age 65 years and older. Among minority group members, nearly half were between the ages of 25 – 44 years (Black 44%, Hispanic 52%, Asian 48%). Analyses of age group by race indicate that persons with TB who were members of minority groups tended to be younger than whites reported with TB. Specifically, 86% of those less than 25 years of age and 86% of those ages 25 – 44 years were members of minority groups.

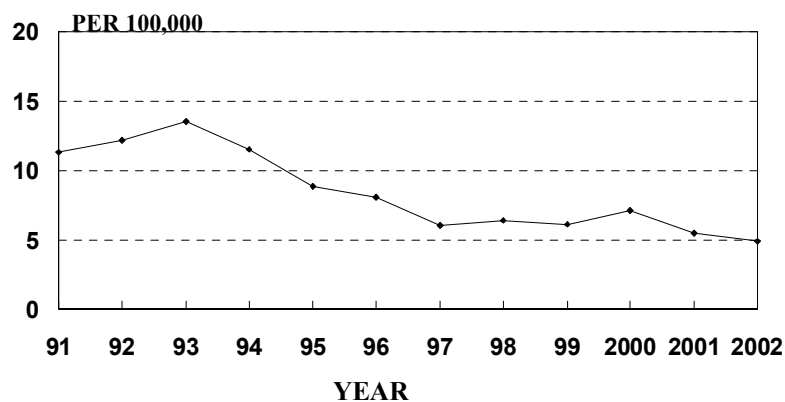
MASSACHUSETTS 2002 TUBERCULOSIS CASES BY AGE, RACE/ETHNICITY

AGE	WHITE/NH		BLACK/NH		HISPANIC		ASIAN		TOTAL
<1-24	6	10.3%	15	19.5%	12	23.1%	10	11.9%	43 15.9%
25-44	16	27.6%	34	44.2%	27	51.9%	40	47.6%	117 43.2%
45-64	16	27.6%	22	28.6%	12	23.1%	19	22.6%	69 25.4%
65+	20	34.5%	6	7.8%	1	1.9%	15	17.9%	42 15.5%
TOTAL	58		77		52		84		271

MDPH/DIVISION OF TB

In 2002, 42 cases (16%) of TB cases were persons age 65 years and older. Case rates have declined greatly since 1991 to a rate of 4.88 in 2002.

RATE OF TUBERCULOSIS IN PERSONS AGE 65 AND OVER MASSACHUSETTS 1991 - 2002



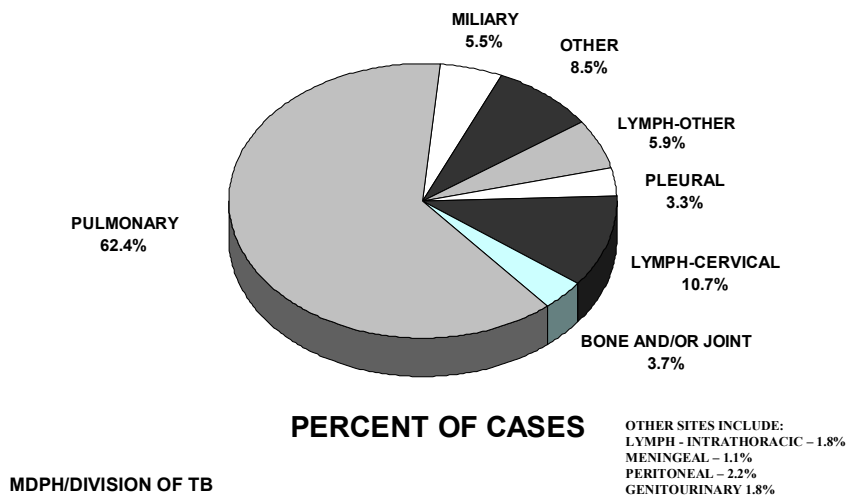
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Clinical Characteristics

Site of Disease

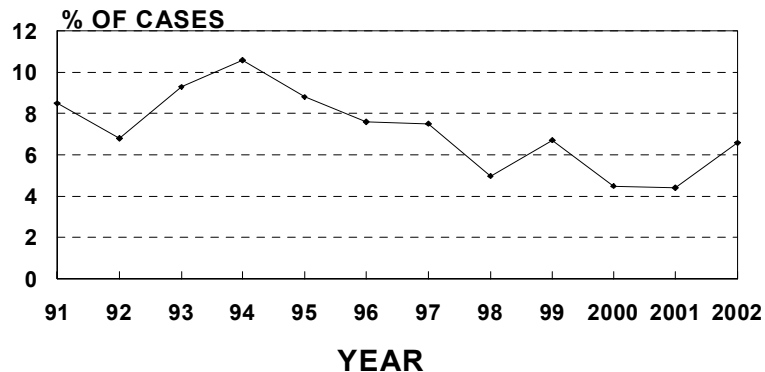
Of the 271 TB cases, 169 (62%) presented with lung as the primary site of disease. This was followed by cervical lymph node - 29 cases (11%), other lymphatic - 16 cases (6%), miliary - 15 cases (6%), bone and/or joint - 10 cases (4%).

MASSACHUSETTS TUBERCULOSIS CASES BY PRIMARY DISEASE SITE 2002 (N=271)



In 2002, 18 TB cases (7%) had multiple sites of disease. The majority of these cases had either pleural or lymphatic involvement.

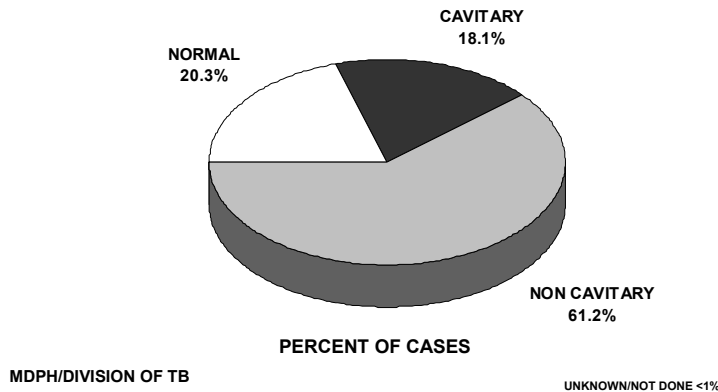
PERCENT OF TUBERCULOSIS CASES WITH MULTIPLE ANATOMICAL SITES OF ACTIVE DISEASE MASSACHUSETTS 1991 -2002 (N = 271)



Chest Radiography Results

Of the 271 cases of TB, 167 (61%) presented with non-cavitary pulmonary disease at time of diagnosis. Forty-nine cases (18%) presented with cavitary disease, 55 cases (20%) had a report of a normal chest x-ray and 1 case (<1%) either did not have chest x-ray done or the results were not available.

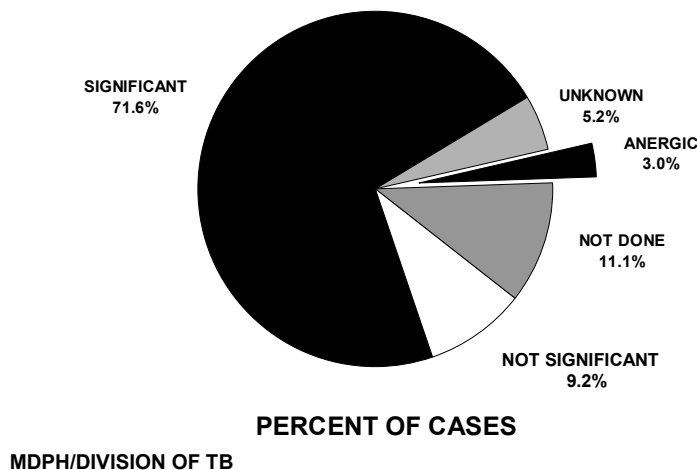
MASSACHUSETTS TUBERCULOSIS CASES BY X-RAY RESULTS 2002 (N=271)



Skin Test Results

One-hundred-ninety-four (72%) of the 271 cases of TB had positive skin test results, 8 cases (3%) were documented to be anergic, 25 cases (9%) had negative results, 14 cases (5%) had unknown results and 30 cases (11%) did not have skin testing done.

MASSACHUSETTS TUBERCULOSIS CASES BY SKIN TEST RESULTS 2002 (N=271)



Bacteriologic Confirmation

In 2002, 211 (78%) of the 271 TB cases were bacteriologically confirmed. This represents a bacteriologically substantiated incidence rate of 3.34 per 100,000 population. This rate of bacteriological confirmation is similar to that observed for the past several years.

Of the 211 bacteriologically confirmed cases, 27 (12.8%) had isolates with anti-tuberculosis drug resistance. Isolates from 16 (59.3% of 27 cases, 7.6% of 211 cases) were resistant to isoniazid (INH) either alone or in combination with other agents. In 2002, 2 cases (7% of 27 cases, <1 % of 211 cases) had multi-drug resistant TB as defined as being resistance to at least INH and rifampin (RIF).

TUBERCULOSIS DRUG RESISTANCE MASSACHUSETTS 2002

	#CASES	%
TUBERCULOSIS CASES	271	100
TUBERCULOSIS CASES WITH DRUG RESISTANT ORGANISM	27	10.0
*BACTERIOLOGICALLY CONFIRMED TB CASES	211	77.9
BACTERIOLOGICALLY CONFIRMED CASES WITH DRUG RESISTANT ORGANISM	27	12.8
BACTERIOLOGICALLY CONFIRMED CASES WITH ISONIAZID RESISTANCE (ALONE OR IN COMBINATION WITH OTHER)	16	7.6

*BACTERIOLOGICALLY SUBSTANTIATED INCIDENCE RATE OF = 3.34 PER 100,000

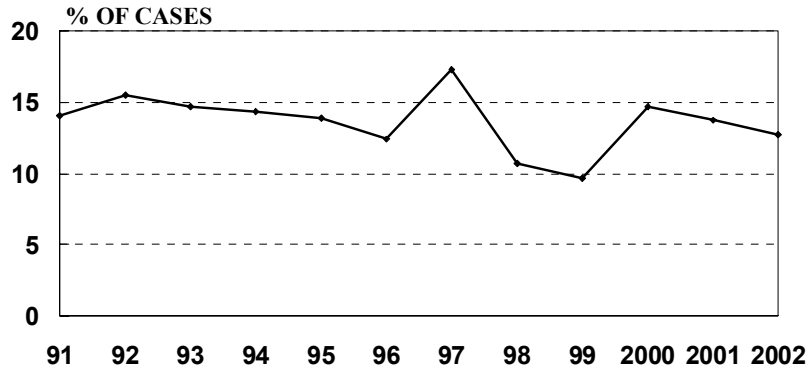
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Cases with Drug Resistance

Note: drug resistance is defined as greater than 1 percent bacterial population resistance to any concentration of that drug. Multi-drug resistance is defined as resistance to isoniazid (INH) and rifampin (RIF), with or without any other resistance.

Since 1992, the proportion of cases with drug resistant TB in Massachusetts has remained in the range of 10 -15% of the total bacteriologically confirmed TB cases (2002 – 12.8%).

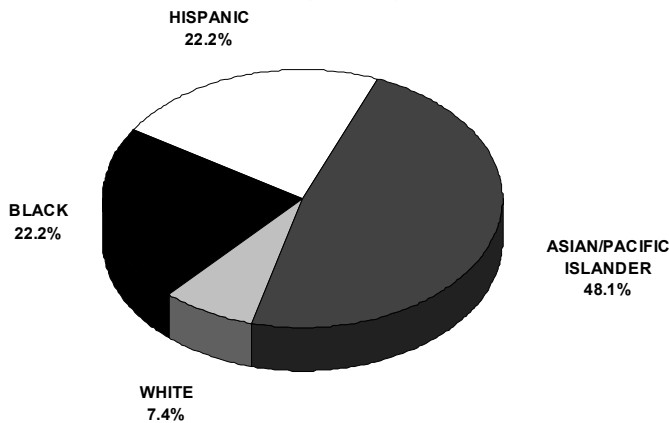
PERCENT OF BACTERIOLOGICALLY CONFIRMED TB CASES WITH DRUG RESISTANT ISOLATES MASSACHUSETTS 1991 - 2002



MDPH/DIVISION OF TB

Analyses of the 27 drug resistant TB cases by race and ethnicity indicate that minority group members accounted for the majority of the drug resistant cases (93%): Black (6 cases,22%), Asian (13 cases,48%), Hispanic (6 cases,22%)

MASSACHUSETTS DRUG RESISTANT TUBERCULOSIS CASES BY RACE/ETHNICITY, 2002 (N=27)



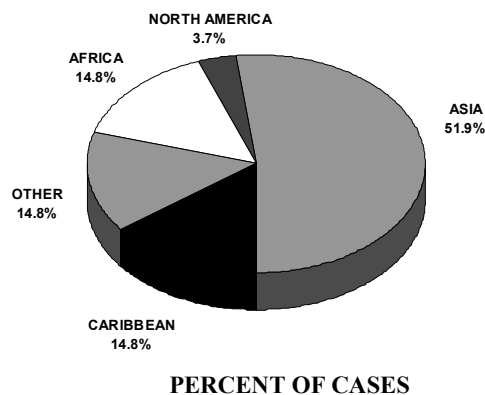
PERCENT

MDPH/DIVISION OF TB

Analyses of the 27 drug resistant cases by place of birth indicate that 93% were

cases in individuals born outside the United States. Countries of origin included: China - 5 cases (19%), Vietnam - 3 cases (11%), India - 3 cases (11%), and Dominican Republic - 2 cases (7%). The remaining 12 cases (44%) were from 12 other countries.

MASSACHUSETTS DRUG RESISTANT TUBERCULOSIS CASES BY PLACE OF BIRTH, 2002 (N = 27)

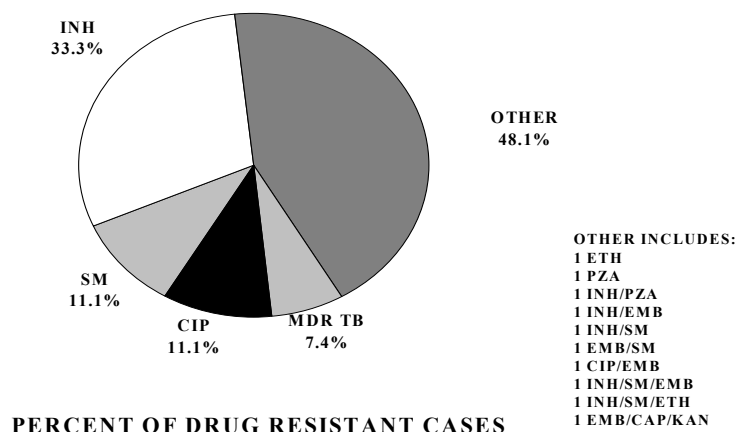


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27 DRUG RESISTANT TB CASES FROM 17 COUNTRIES.

Of the 27 TB cases with drug resistant disease, isolates from 9 cases (33%) were resistant to INH alone, 3 cases (11%) were resistant to streptomycin (SM) alone, 3 cases (11%) were resistant to Ciprofloxacin alone, 10 cases (37%) were resistant to other combination of drugs and 2 cases (7%) had multi-drug resistant TB (resistant to at least INH/RIF).

MASSACHUSETTS TUBERCULOSIS CASES BY DRUG RESISTANCE PATTERN, 2002 (N = 27)



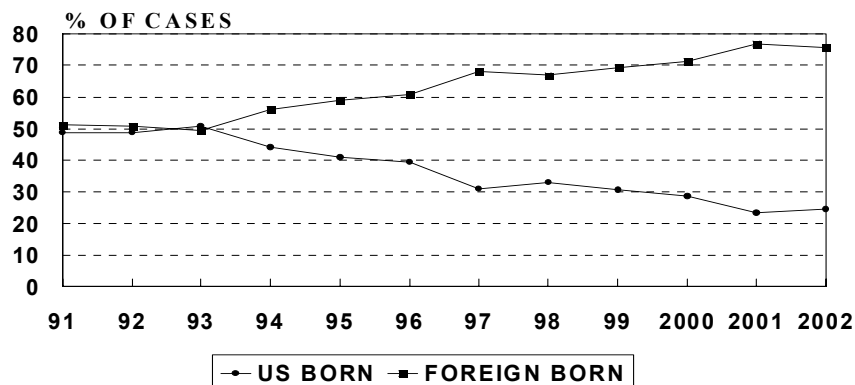
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High Risk Group Profile

Cases in Foreign-Born Persons

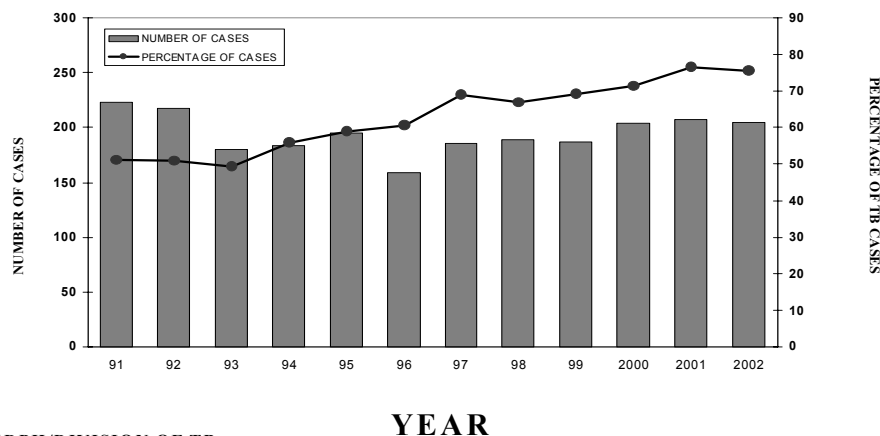
The foreign-born (defined as persons born outside the United States and its territories) remain the group at highest risk for TB in Massachusetts. In the year 2002, 205 (76%) of the TB cases occurred in persons not born in the U.S. Over the years, the foreign-born have accounted for an increasing proportion of the TB cases in Massachusetts (1984 - 35%, 1991- 51%, 1995 - 59%, 1999 – 69%, 2002 - 76%). While the proportion of cases occurring among the foreign-born has increased, the absolute numbers of such cases has been essentially stable since 1993.

TUBERCULOSIS CASES BY PLACE OF BIRTH MASSACHUSETTS 1991 - 2002



MDPH/DIVISION OF TB

TRENDS IN TB CASES IN FOREIGN-BORN PERSONS, MASSACHUSETTS 1991 - 2002

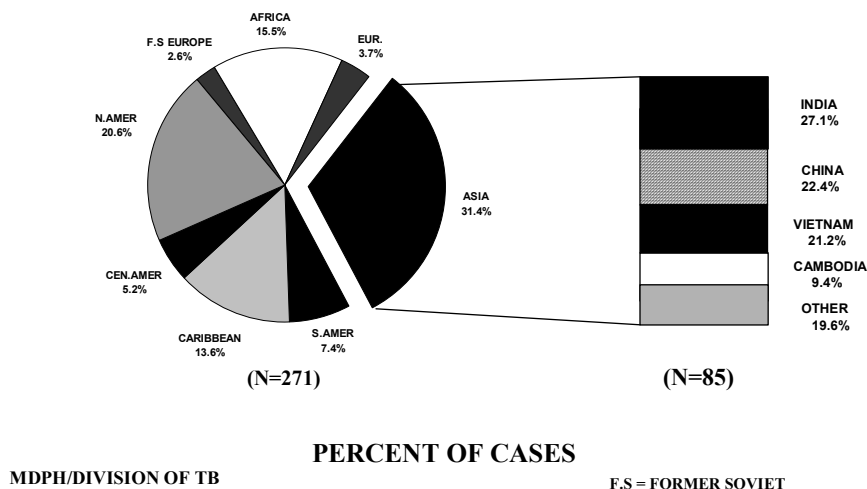


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Of the 205 foreign-born with TB in 2002, persons from India were the largest group with 23 cases (11%), followed by China -19 cases (9%), Vietnam -18 cases (9%), Haiti – 16 cases (8%), Brazil -11 cases (5%), Cambodia - 8 cases (4%), Uganda – 7 cases (3%) and Dominican Republic – 7 cases (3%). The remaining 96 cases (47%) were from 50 different countries.

When foreign-born cases were analyzed by geographic region, the largest proportion of cases were from Asia with 85 cases (31%), followed by Africa with (16%) and the Caribbean (14%).

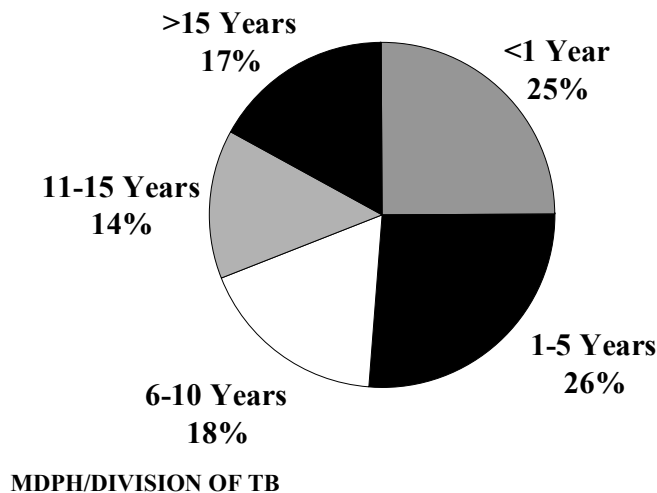
MASSACHUSETTS TUBERCULOSIS CASES PLACE OF BIRTH BY WORLD REGIONS 2002



Between 1993 and 2002, there were 1,897 TB cases in the foreign-born reported in Massachusetts. Of the 1,897, 1,078 (57%) were from 7 countries that include; Vietnam (273 cases, 14%), Haiti (232 cases, 12%), China (163 cases, 9%), India (159 cases, 8%), Cambodia (105 cases, 6%), Dominican Republic (83 cases, 4%), Brazil (63 cases, 3%). The remaining 819 (43%) cases were from 105 different countries.

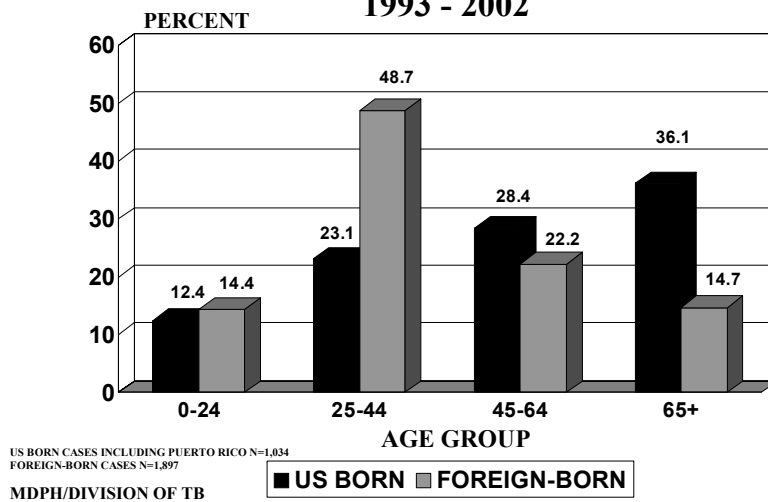
Risk for developing TB disease is highest during the first few years after arrival into the U.S. Analysis of the 1,897 foreign-born TB cases indicates that 966 cases (51%) developed TB disease within 5 years of arriving in the U.S.

**TIME INTERVAL BETWEEN ARRIVAL IN THE US
AND TB DIAGNOSIS FOREIGN BORN TB CASES
1993 – 2002, N=1,897**



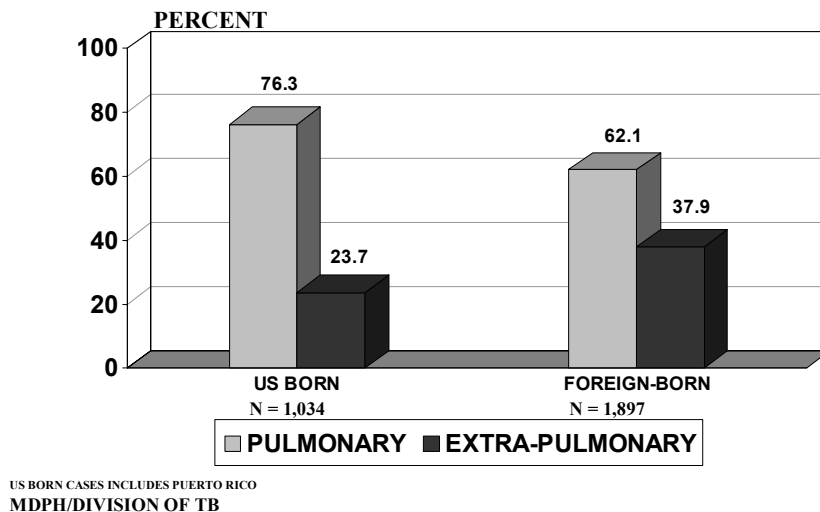
Comparison of foreign-born cases and U.S-born TB cases by age group and primary site of disease (N=1,897 TB cases reported between 1993 and 2002). The foreign-born with TB were likely to be younger than those born in the U.S. In particular, a greater proportion of foreign-born cases were between the ages of 25 – 44 years old (49% vs 23%). A greater proportion of those age 65 years and older were U.S.-born (36% vs 15%).

**MASSACHUSETTS FOREIGN-BORN AND
US BORN CASES BY AGE GROUP
1993 - 2002**



The U.S-born TB cases are more likely to have pulmonary disease than foreign-born cases (76% vs 62%).

MASSACHUSETTS FOREIGN-BORN AND US BORN CASES BY SITE OF DISEASE 1993 - 2002



Cases in the Homeless Population

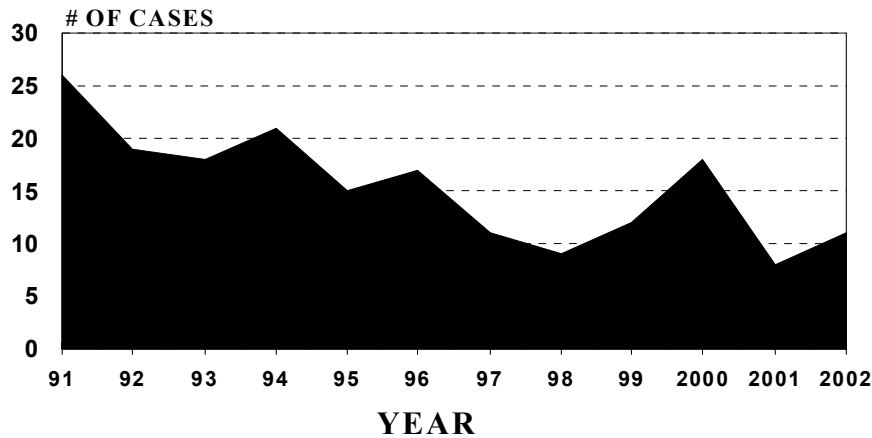
A homeless person is defined as a person who lacks a fixed, regular and adequate night-time residence, including a person who resides in shelters, welfare hotels, on the street, or in a single room occupancy hotel, and who is not paying rent, does not own a home and is not steadily living with relatives or friends.

Note: data reported prior to 1993 for homeless was limited to persons who were homeless at time of diagnosis. In 1993, the CDC revised the definition of homeless to include persons who had been homeless within a year prior to diagnosis.

The 2000 census indicates that there are 6,210 homeless persons in the Boston. The Massachusetts Bureau of Health Statistics estimates that there are approximately 31,100 homeless persons statewide. Case rates were calculated based on these figures.

Of the 271 cases of TB reported in 2002, 11 cases (4%, case rate 35.37 per 100,000) were reported to have been homeless. Among the 11 homeless cases, 6 (55%) were from the City of Boston and 1 had drug resistant disease.

TB CASES AMONG THE HOMELESS MASSACHUSETTS 1991 - 2002

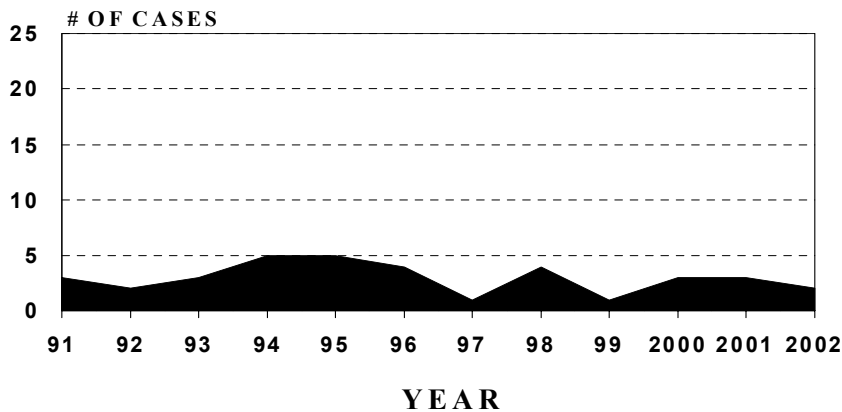


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Cases in Correctional Facilities

Between 1989 and 1991, an outbreak of TB occurred at a prison facility located in the southeastern part of the state. Following this outbreak and the massive screening and educational programs that followed, routine screening of inmates was instituted at all the state prison facilities. Since 1991, few TB cases in MA are diagnosed within correctional settings. In 2002, 2 cases (<1%) of TB were diagnosed in correctional facilities.

MASSACHUSETTS TUBERCULOSIS CASES IN CORRECTIONAL FACILITIES 1991 - 2002

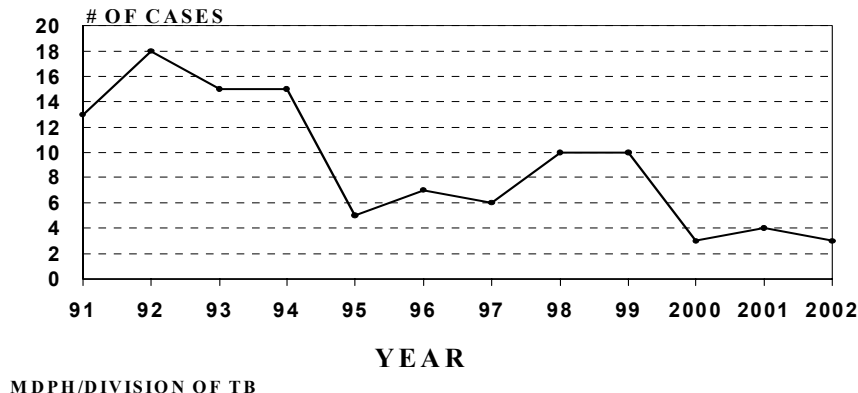


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Cases in Long Term Care Facilities

In 2002, 3 cases (1%) of TB were reported in persons residing in long term care facilities at time of diagnosis, which included 2 from nursing homes and 1 from another residential facility. There has been an overall decline in the number of TB cases diagnosed in these settings.

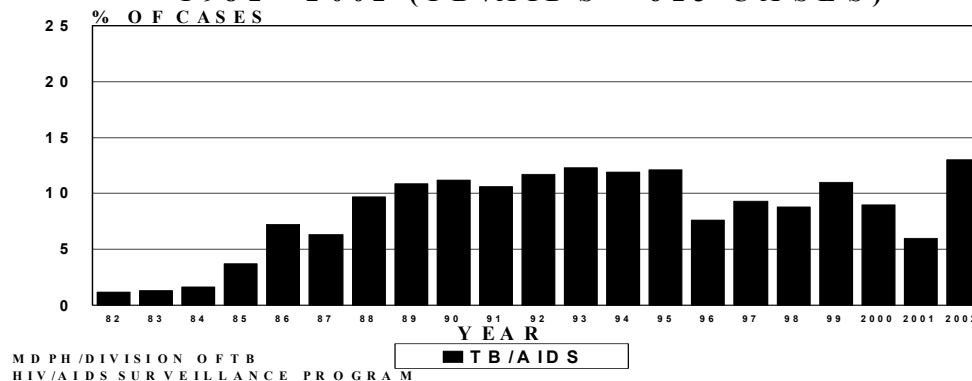
TUBERCULOSIS CASES IN RESIDENTS OF LONG TERM CARE FACILITIES MASSACHUSETTS 1991 - 2002



TB/AIDS Cases

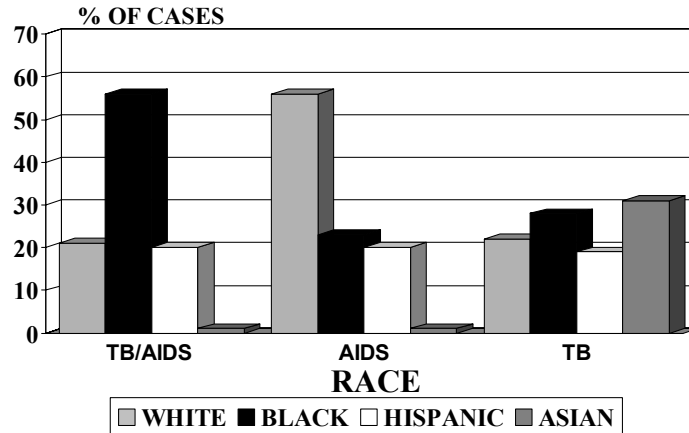
Match of the TB registry to the AIDS registry has taken place annually since 1992. In 1993, the AIDS case definition was revised to include anyone with HIV infection with TB disease at any site. Between 1982 – 2002, 623 TB/AIDS cases were identified. In 2002, 38 TB cases (14%) were co-infected with HIV.

PERCENT OF TB CASES DIAGNOSED WITH AIDS 1982 - 2002 (TB / AIDS = 623 CASES)



Minority group members accounted for the majority of the TB/AIDS cases (481 cases, 79%). When compared to the reported AIDS cases and TB cases, a greater proportion of TB/AIDS cases were Black (23% of AIDS and 28% of TB vs 56% of TB/AIDS). In addition, when compared to the TB cases, few TB/AIDS cases and AIDS cases were Asians (1% TB/AIDS and 1% of AIDS vs 31% of TB).

MASSACHUSETTS TB/AIDS , AIDS AND TB**
CASES BY RACE 1982 - 2002
(TB/AIDS = 623 CASES)

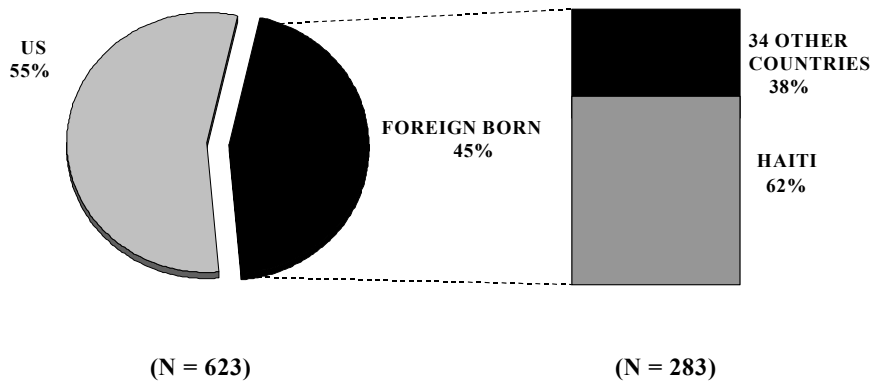


MDPH/DIVISION OF TB
HIV/AIDS SURVEILLANCE PROGRAM

*AIDS CASES EXCLUDES THOSE DIAGNOSED WITH TB
 **TB CASES FROM 2002

Of the 623 TB/AIDS cases reported between 1982 – 2002, 283 cases (45%) were persons born outside of the U.S. and territories. The majority of the foreign-born TB/AIDS cases (62%) are from Haiti.

MASSACHUSETTS TB/AIDS CASES BY
PLACE OF BIRTH 1982 - 2002

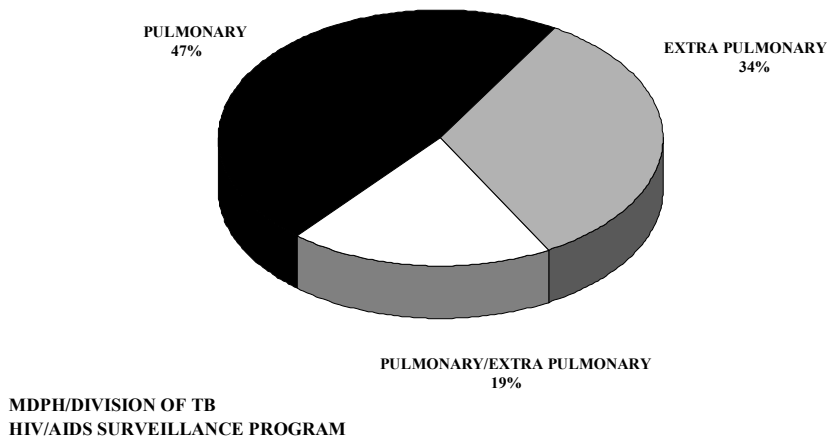


MDPH/DIVISION OF TB
HIV/AIDS SURVEILLANCE PROGRAM

US BORN INCLUDES US DEPENDENCIES

Analysis of TB disease site among TB/AIDS cases indicates that 294 cases (47%) had only pulmonary involvement, 214 cases (34%) had only extra-pulmonary disease and 115 cases (19%) had both pulmonary and extra-pulmonary involvement.

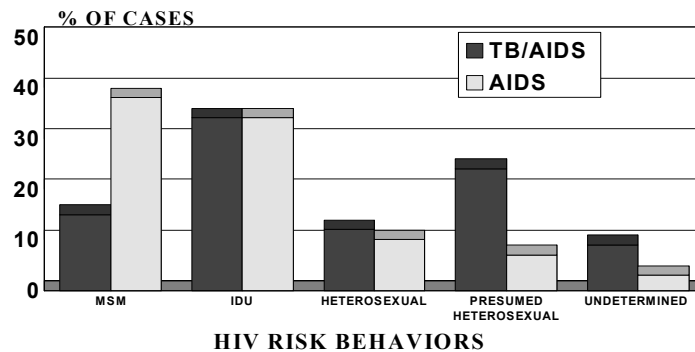
**MASSACHUSETTS TB/AIDS CASES BY
TB DISEASE SITE 1982 - 2002
(TB/AIDS = 623 CASES)**



Analyses of TB/AIDS cases by HIV risk behavior indicate that, for TB/AIDS cases, the most common HIV risk is injecting drug use (211 cases, 34%), followed by presumed heterosexual contact (147 cases, 24%) and men who have sex with men (94 cases, 15%). Compared to AIDS cases, a greater proportion of TB/AIDS cases contracted HIV infection through presumed heterosexual contact (24% vs 7%).

Heterosexual risk is defined as sexual contact with someone of the opposite sex who is known to be HIV infected or to be at risk for HIV infection. Presumed heterosexual contact is defined as an individual with no reported risk who has sexual partners not known to be HIV infected or at risk.

**MASSACHUSETTS TB/AIDS AND AIDS*
CASES BY HIV RISK BEHAVIORS
1982 - 2002 (TB/AIDS = 623 CASES)**

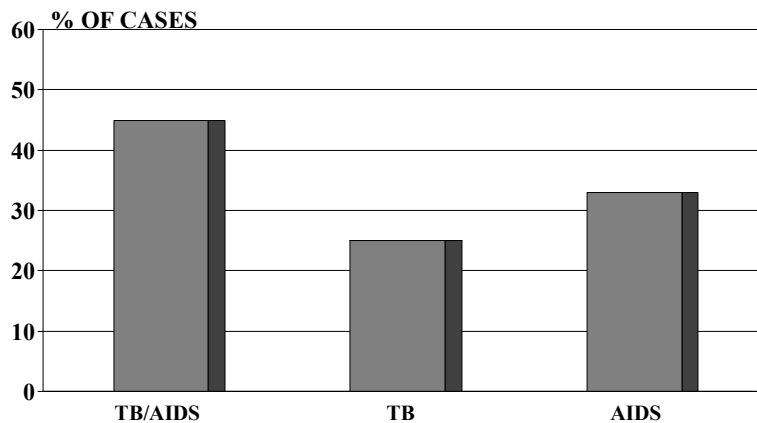


MDPH/DIVISION OF TB
HIV/AIDS SURVEILLANCE PROGRAM

IDU=INJECTION DRUG USE
MSM=MALE SEX WITH MALE
*AIDS CASES EXCLUDES THOSE DIAGNOSED WITH TB

At time of AIDS diagnosis, 45% of the TB/AIDS cases resided in the City of Boston as compared to 25% TB cases and 32% AIDS cases.

**PROPORTION OF MASSACHUSETTS TB/AIDS
CASES RESIDING* IN BOSTON
1982 - 2002 (TB AIDS = 623 CASES)**



MDPH/DIVISION OF TB
HIV/AIDS SURVEILLANCE PROGRAM

*RESIDENCE AT TIME OF AIDS DIAGNOSIS